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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|-------------------------|---------------------|------------------|
| 09/332,271 | 06/11/1999 | KLAUS FLORIAN SCHUEGRAF | MI22-532 | 2716 |

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EXAMINER

POMPEY, RON EVERETT

| ART UNIT | PAPER NUMBER |
|----------|--------------|
|----------|--------------|

2812

DATE MAILED: 08/13/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/332,271

Applicant(s)

SCHUEGRAF ET AL.

Examiner

Ron E Pompey

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 25 March 2002.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 and 29-36 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 and 29-36 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ku et al. ("The application of ion-beam mixing, doped silicide, and rapid thermal processing self-aligned silicide technology", VLSI Technology, Systems and Applications, May 17-19, 1989, Pages 337-341) or Chen et al. (US 5,472, 896).

Ku discloses the steps of:

for claims 1-32

forming a silicide layer against the polysilicon layer;
proving an impurity within the silicide layer, by ion implantation; and
providing the polysilicon layer and the silicide layer into a conductive line shape
(Fig. 1, last paragraph of first column – first paragraph in column 2 of page 337 and page 340).

Ku discloses the claimed invention except for the other various methods of doping a silicide layer, besides ion implantation. It would have been an obvious matter of design choice to dope the silicide layer by any of the other claimed methods, since applicant has not disclosed that any of the methods of doping in itself solves any stated problem other than the doping of the silicide and it appears that the method of doping

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silicide is not the critical part of the invention, therefore the invention would perform equally well with any doping method of the silicide.

3. Chen discloses the steps of newly added claims 33-36.

For claims 33-36:

forming a silicide layer (16, fig. 3a) over the polysilicon layer (14, fig. 3a) and substrate; and

after the forming of the silicide, patterning (fig. 3b) the polysilicon and silicide layers to form a conductive line (col. 4, Ins. 29-44).

Chen discloses the claimed invention except for wherein the providing of the conductivity-enhancing impurity is performed before the patterning of the polysilicon and the silicide layers. It would have been an obvious matter of design choice, to provide the conductivity-enhancing impurity is performed before the patterning of the polysilicon and the silicide layers, applicant has not disclosed that there is a distinct or critical advantage by providing the impurity before or after patterning to form the conductive line, therefore the invention would perform equally well whether doping of the silicide is done before or after forming the conductive line.

Response to Arguments

4. Applicant's arguments filed 3-25-02, pertaining to claims 1-20 and 29-36, have been fully considered but they are not persuasive. The applicant argues that Ku fails to teach forming a silicide layer against a polysilicon layer and providing a conductivity-enhancing impurity within the silicide layer and exposing the silicide to an oxidizing

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atmosphere. As seen in figure 1 the exposed polysilicon gate electrode is also covered with a silicide as with the substrate. Therefore the exposed polysilicon gate electrode also will be implanted as the substrate is implanted with conductivity-enhancing impurities. The doping is done during formation of source and drain and phosphorus is a common dopant used in the art for forming source and drain regions, therefore it would be obvious for one of ordinary skill to use phosphorus instead of boron or arsenic as the conductivity enhancement impurity. Also in figure 1 of Ku it clearly shows forming an oxide after the silicide is formed and therefore it is inherent that the silicide is exposed to an oxygen-comprising atmosphere.

5. Applicant's arguments with respect to claims 33-36 is have been considered but are moot in view of the new ground(s) of rejection.

Conclusion


6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).


A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not

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mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ron E Pompey whose telephone number is (703) 305-3016.


Ron Pompey
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August 12, 2002


John F. Nickling
Supervisory Patent Examiner
Technology Center 2700